

WHAT IS CLAIMED IS:

1. An erase method for a nonvolatile semiconductor storage device in which floating gate field effect transistors each having a control gate, a floating gate, a drain and a source and being electrically information programmable and erasable are arrayed in a matrix shape on a substrate or well, and which comprises a plurality of row lines connected to the control gate of each of floating gate field effect transistors arrayed along a row direction, and a plurality of column lines connected to the drain and source of each of floating gate field effect transistors arrayed along a column direction, the method comprising:

using the Fowler-Nordheim tunneling phenomenon for both programming and erasing; and  
for erasing, applying a negative first voltage to the substrate or well and applying a positive voltage to select row lines, while applying a negative second voltage to non-select row lines.

2. The erase method for a nonvolatile semiconductor storage device according to Claim 1; wherein  
the negative second voltage has an absolute value not larger than an absolute value of the negative first voltage.

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3. A row decoder for applying a select voltage and a non-select voltage to select word lines and non-select word lines of a nonvolatile semiconductor storage device, the select word lines and the non-select word lines being determined according to an address signal, on a mode-by-mode basis for each of a program mode, a read mode and an erase mode, the row decoder comprising:

control voltage output means for, on the mode-by-mode basis, outputting a control voltage responsive to 10 select/non-select information which is determined according to the address signal;

select voltage output means for, on the mode-by-mode basis, outputting a select voltage responsive to a select state which is determined according to the address 15 signal;

non-select voltage output means for, on the mode-by-mode basis, outputting a non-select voltage responsive to a non-select state which is determined according to the address signal; and

applied voltage select means for, in the erase mode, selecting either one of the select voltage derived from the select voltage output means or the non-select voltage derived from the non-select voltage output means according to the control voltage derived from the control 25 voltage output means, and outputting the selected voltage

to select word lines while outputting the non-selected voltage to non-select word lines.

4. A row decoder for applying a select voltage and a non-select voltage to select word lines and non-select word  
5 lines of a nonvolatile semiconductor storage device, the select word lines and the non-select word lines being determined according to an address signal, on a mode-by-mode basis for each of a program mode, a read mode and an erase mode, the row decoder comprising:

10 control voltage output means for, on the mode-by-mode basis, outputting a control voltage responsive to select/non-select information which is determined according to the address signal;

15 high voltage output means for, on the mode-by-mode basis, outputting a high voltage not less than a specified voltage responsive to a select state which is determined according to the address signal;

20 low voltage output means for, on the mode-by-mode basis, outputting a low voltage lower than the high voltage responsive to a non-select state which is determined according to the address signal; and

25 applied voltage select means for, in the erase mode, selecting either one of the high voltage derived from the high voltage output means or the low voltage derived from the low voltage output means according to the control

voltage derived from the control voltage output means, and outputting the high voltage to select word lines as the select voltage while outputting the low voltage to non-select word lines as the non-select voltage.

5. 5. The row decoder according to Claim 3, wherein in the erase mode, the select voltage is a positive voltage, while the non-select voltage is a negative voltage; and

10. an absolute value of the non-select voltage is not larger than an absolute value of the negative voltage applied to the substrate or well of the nonvolatile semiconductor storage device.

6. The row decoder according to Claim 4, wherein in the erase mode, the select voltage is a positive voltage, while the non-select voltage is a negative voltage; and

15. an absolute value of the non-select voltage is not larger than an absolute value of the negative voltage applied to the substrate or well of the nonvolatile 20. semiconductor storage device.